SYMONS'S
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METEOROLOGICAL MAGAZINE.

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THE BRITISH ASSOCIATION AT BRISTOL.

ALTHOUGH Prof. Balfour Stewart's address was one of the best ever delivered, the Meteorological papers (using the term in its strict sense) at the late meeting were not above the average, either in number or in quality. As, however, we hope to print abstracts of them all, it is unnecessary to criticize them.

The Meteorologists present included the following :—

Belcher, Adml. Sir E., K.C.B.
*Black, Surgeon-Major, W. T.
Blake, W.
Brady, Sir Antonio, Kt., F.G.S.
*Burder, G. F., M.D.
Bush, Clement
Clegram, W. B., C.E.
*Dines, G.
*Dowson, E. T.
*Dymond, E. E.
Elliot, Robert, F.R.S.E.
Elliot, Sir Walter, K.C.S.I., F.L.S.
Enniskillen, The Earl of, D.C.L., F.R.S.
*Everett, Prof. J. D., M.A., D.C.L.
*Field, Rogers, B.A., C.E.
Galton, F., F.R.S., F.G.S.
Gamble, J. G., B.A.
*Glaisher, J., F.R.S.
Hector, Dr. J., F.R.S.
Hennessy, Prof. H., F.R.S.
Herschel, Prof. A. S., F.R.A.S.
Knight, Rev. R. J.
Longman, W.
Lund, C.
McCullough, Dr. D. M.
*McLachlan, R., F.L.S.
Main, Rev. R., F.R.S.
Matthew, Rev. J.
*Muirhead, H., M.D.
*Narayan, N., C.E.
Nash, A. S.
*Ormerod, G. W.
*Osler, A. F., F.R.S.
Parkes, W.
Pengelly, W., F.R.S.
*Perry, Rev. S. J., F.R.S., F.R.A.S
*Rawson, Rawson W., C.B.
Rodwell, G. F.
*Smyth, J., junr., M.A.
Sopwith, Thos., M.A., F.R.A.S.
*Stewart, Prof. Balfour, M.A., F.R.S.
Strange, Lt.-Col. Alexander, F.R.S.
*Symons, G. J.
Talmage, C. G., F.R.A.S.
*Tomlinson, Charles, F.R.S.
Toynbee, Captain H.
Tuckett, F. F.
Vivian, E.
*Walter, A. W.

The "Meteorological Breakfast," inaugurated at Belfast, was well attended at Clifton, and included all the gentlemen above-mentioned to whose name an asterisk is prefixed.

The following are titles of all the papers upon, or bearing upon, Meteorology :—

Prof. W. F. Barrett—On a self-registering rain gauge.
Dr. J. Croumbie Brown.—South African Torrential Rivers.
" " " —The late Inundations in France in reference to Forest Clothing of the Mountains.

Dr. W. B. Carpenter—Bearings of Recent Observations on the Doctrine of Oceanic Circulation.

Jas. Croll.—The Wind and Gravitation Theories of Oceanic Circulation.

Professor Everett.—Report of the Underground Temperature Committee.

James Glaisher.—Report of the Committee on Luminous Meteors.

Professor Hennessey.—On the Influence of the Physical Properties of Water on Climate.

Professor Hennessey.—On the possible Influence on Climate of the Substitution of Water for Land in Central and Northern Africa.

Dr. J. Janssen.—On Mirage at Sea.

Professor W. Stanley Jevons.—On the Influence of the Sun-spot Period upon the Price of Corn.

N. Lowenthal Lonsdale.—Mechanical Self-registering Apparatus for Barometer, Thermometer, Rain and Wind Gauges.

Rev. R. Main.—List of Meteors observed at Oxford.

A. Malloch.—On a mode of Producing a Sharp Meridian Shadow.

C. Meldrum.—Letter on Rainfall Periodicity.

T. Moffat.—On the apparent Connection between Sun-spots, Atmospheric Ozone, and Force of Wind.

Professor Osborne Reynolds.—On the Refraction of Sound by the Atmosphere.

G. J. Symons.—Report of Committee on British rainfall.

G. J. Symons.—On the rainfall in Monmouthshire and the Severn Valley, on July 14th, and on some subsequent floods in England and Wales.

Captain H. Toynbee.—Physical Geography of the Equatorial Region of the Atlantic.

But before passing to the papers we have to consider the inaugural address of the President of the Section, Prof. Balfour Stewart; and it was so good that we are sure that in devoting to it the large space necessary for its reproduction, we are acting in the best interest of our readers :—

Since the last meeting of the British Association, science has had to mourn the loss of one of its pioneers, in the death of the veteran astronomer, Schwabe, of Dessau, at a good old age, not before he had faithfully and honourably finished his work. In truth this work was of such a nature that the worker could not be expected long to survive its completion.

It is now nearly fifty years since he first began to produce daily sketches of the spots that appeared upon the sun's surface. Every day on which the sun was visible (and such days are more frequent in Germany than in this country), with hardly any intermission for forty years, this laborious and venerable observer made his sketch of the solar disc. At length this unexampled perseverance met with its reward in the discovery of the periodicity of sun-spots, a phenomenon which very speedily attracted the attention of the scientific world.

It is not easy to over-rate the importance of the step gained when a periodicity was found to rule these solar outbreaks. *A priori* we should not have expected such a phenomenon. If the old astronomers were perplexed by the discovery of sun-spots, their successors must have been equally perplexed when they ascertained their periodicity. For while all are ready to acknowledge periodicity as one of the natural conditions of terrestrial phenomena, yet everyone is inclined to ask what there can be to cause it in the behaviour of the sun himself. Manifestly it can only have two possible causes. It must either be the outcome of some strangely hidden periodical cause residing in the sun himself, or must be produced by external bodies, such as planets, acting somehow in their varied positions on the atmosphere of the sun. But whether the cause be an internal or external one– in either case we are completely ignorant of its nature.

We can easily enough imagine a cause operating from the sun himself and his relations with a surrounding medium to produce great disturbances on his surface, but we cannot easily imagine why disturbances so caused should have a periodicity.

On the other hand we can easily enough attach periodicity to any effect caused by the planets, but we cannot well see why bodies comparatively so insignificant should contribute to such very violent outbreaks as we now know sun-spots to be.

If we look within we are at a loss to account for the periodicity of solar disturbances, and if we look without we are equally at a loss to account for their magnitude. But since that within the sun is hidden from our view, it cannot surely be considered blameworthy if astronomers have directed their attention to that without, and have endeavoured to connect the behaviour of sun-spots with the positions of the various planets. Stimulated no doubt by the success which had attended the labours of Schwabe, an English astronomer was the next to enter the field of solar research.

The aim of Mr. Carrington was, however, rather to obtain very accurate records of the positions, the sizes, and the shapes of the various sun-spots than to make a very extensive and long-continued series of observations. He was aware that a series at once very accurate and very extended is beyond the power of a private individual, and can only be undertaken by an established institution. Nevertheless, each sun-spot that made its appearance during the seven years extending from the beginning of 1854 to the end of 1860 was sketched by Mr. Carrington with the greatest possible accuracy, and had also its heliographic position, that is to say its solar latitude and longitude, accurately determined.

One of the most prominent results of Mr. Carrington's labours was the discovery of the fact that sun-spots appear to have a proper motion of their own—those nearer the solar equator moving faster than those more remote. Another was the discovery of changes, apparently periodical, affecting the disposition of spots in solar latitude. It was already known that sun-spots confined themselves to the sun's equatorial regions, but Mr. Carrington showed that the region affected was liable to periodical elongations and contractions, although his observations were not sufficiently extended to determine the exact length of this period.

Before Mr. Carrington had completed his seven years' labours, celestial photography had been introduced by Mr. Warren De la Rue. Commencing with his private observatory, he next persuaded the Kew Committee of the British Association to allow the systematic photography of the sun to be carried on at their observatory under his superintendence, and in the year 1862 the first of a ten years' series of solar photographs was begun. Before this date, however, Mr. De la Rue had ascertained, by means of his photoheliograph, on the occasion of the total eclipse of 1860, that the red prominences surrounding the eclipsed sun belong, without doubt, to our luminary himself.

(To be continued.)

REDUCTION OF BAROMETER READINGS TO SEA LEVEL.

To the Editor of the Meteorological Magazine.

SIR,—With respect to barometric reductions to sea level, "J. G. H.," in the July magazine, does not, I think, quite solve the matter. There are several tables derived from formulæ (by Laplace, Bessel and others) for computing with accuracy barometrical heights; but they do not agree, because different numerical values are used in their construction. Guyot employs Laplace's formula, co-efficient of expansion ·00260, and makes ·4 of an inch at a pressure of 30 in. correspond to 346 feet; whilst Delcros, employing the same formula but different co-efficient ·00283, makes that elevation at the same pressure equal 353 feet (*vide* Smithsonian Meteorological Tables). Plantamour employs Bessel's formula, and co-efficient ·00204; Baily, ·00222.

These tables being computed by formulæ worked out with different

constants, necessarily disagree as much as the ordinary tables that are published (*vide* Buchan, Drew and Scott). I think meteorologists should come to some understanding as to what tables should be employed.—Yours faithfully,

KAUFMANN J. MARKS.

14, *Warrington Crescent, Maida Hill, W.*

[We have received from a competent writer some memoranda upon this subject, but in so rough a form that he does not wish his name attached to, or to be held responsible for, them. As we think that they are far too good for the waste basket we print them just as they are, with these few words of prefatory explanation.]

The letter of "J. G. H." in July number appears to be altogether founded on a misapprehension—

(1). The correction deduced from Sir Geo. Shuckburgh's formula is *not* intended to apply to mean height of barometer, and *does* take into account the variation due to variation of height of barometer at place of observation.

(2). The methods of correction ordinarily used for reducing barometrical observations to sea level *are* derived from the formula for determining heights by the barometer.

(3). The Tables for correction in ordinary use are more convenient for the purpose than the method suggested by "J. G. H."

(4). No reliable rule can be given for the variation of temperature with the height, and even if it could it would not generally be worth while using, as the correction due to this would be so slight. Taking a station 600 feet above sea level, and assuming the temperature at it to be 50°, and at sea level 52°,* the correction due to taking the true mean temp. 51° instead of the temp. at upper station 50°, would only be ·001 inch.

Mr. Kaufmann Marks' letter, in May number, is much more to the purpose. The differences in the tables of correction arise (1) from the formulæ used, (2) from the constants employed in the formulæ.

(1). Sir Geo. Shuckburgh's formula is now generally acknowledged to be incorrect, and that of Laplace is adopted in lieu of it. "Scott's Instructions" are founded on Laplace's formula.

(2). The constants employed in Laplace's formula vary, and the "height of a column of air which will cause a rise of 1 inch of mercury at a temperature of 32°," or in other words, the relative weights of air and mercury is one of these constants. Scott adopts Laplace's original constants, but these have been modified by Plantamour and other recent authorities.

Mr. Kaufmann Marks makes an error in his postscript. ·004 is Laplace's co-efficient of expansion of moist air for centrigade degrees; ·002036 Regnault's co-efficient of expansion of dry air for *Fahrenheit* degrees, and therefore not comparable. I have not the other books to refer to, but believe Drew and Gay-Lussac to be Fahrenheit.

* 1° in 300 feet.

THUNDERSTORM OF AUGUST 3RD.

To the Editor of the Meteorological Magazine.

SIR,—On the morning of Tuesday last, the 3rd of this month, a violent thunderstorm burst over this chapelry and portions of the adjoining parishes. About 10.35 distant thunder was heard in the south west, which became more frequent and approached rapidly. At 11.15 a deluge of great rain fell for three or four minutes, followed by a fall of large hailstones, from the size of peas to that of small marbles. This continued for four or five minutes more, till the ground was nearly covered. A violent rain then set in, which continued nearly an hour, accompanied by frequent brilliant lightning, terrific peals of thunder, and great darkness. The storm then passed off to the north, and a steady rain fell for an hour longer.

During the continuance of the storm, the fall of rain and hail amounted to 1·71 in. in depth, of which about 1·50 in. fell during the first hour. When the rain gauges were examined after the storm, the water was found to be opaque, and of a bluish-black colour, but appeared to contain no sediment. The same was the case with all the soft-water tanks in the district, even those supplied from slated roofs, where there could be no chance of contamination from extraneous matter. The storm appears to have been confined to a small locality, for at the distance of a few miles to the east and west, there was no violent rain. No damage was done by the lightning or the hail, but the fields and roads were greatly washed by the rain.

I am, dear Sir, yours truly,

THOS. HENRY DAVIS.

Orleton, Tenbury, August 7th, 1875.

THUNDERSTORMS OF AUGUST 7TH.

THERE were several detached storms on this day, and at present we are unable to define their areas precisely. Even in the immediate vicinity of the Metropolis our information is insufficient to prove whether there was or was not any connection between the Enfield and Blackheath storms. It will be convenient to give the totals which have at present reached us :—

Camden Square	0·45 in.	Bickley	1·70 in.
Muswell Hill	0·43	Chislehurst	1·40
Pinner Hill	0·00	Beckenham Hall	1·75
Enfield	2·75	,, Foxgrove	1·69
Riverhead	0·12	Forest Hill	1·48
Bromley Common	1·25	Greenwich	1·24

To the Editor of the Meteorological Magazine.

SIR,—One of the most awful thunderstorms that has visited this neighbourhood for many years occurred here to-day. Thunder was first heard in S. soon after 1 p.m. The storm approached slowly from S., and from 1·45 to 3.30 p.m. the lightning and thunder were terrific, the storm most of the time being overhead. A tremendous fall of hail

and rain commenced at 2.5 and ceased at 3, during which time no less than 2·75 in. fell—the largest fall I have ever registered. Incessant thunder continued in S. and S.E. till 5 p.m., when the clouds rapidly dispersed. Frequent lightning after dark.

The rain caused great damage, the roads at places being almost destroyed and the town completely inundated, the water in some streets being 3 to 4 feet deep.—Yours truly,

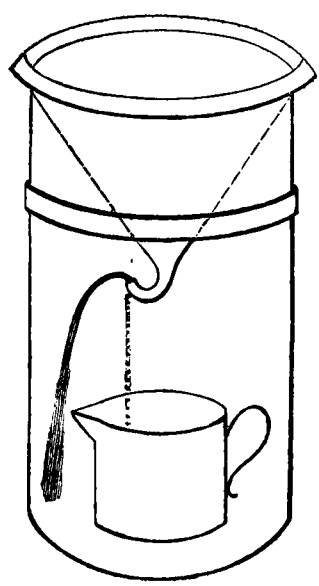
THOS. PAULIN.

P.S.—Since writing the above, I find the damage done by the flood has been very serious. At Mr. Twells' a large tree was struck, and sixty feet of brick wall carried away by the water. The water was 4 to 6 feet deep in many houses, and walls have been carried away in several places, in one place 30 yards of brick wall 12 feet high.

Enfield, 7th August, 1875.

To the Editor of the Meteorological Magazine.

SIR,—I want to draw your attention to what appears to me to be a defect in Glaisher's Rain-gauge. I have not noticed it before, but I never remember having such rain as we had here on the 7th. On examining the gauge I found not above half-an-inch in the cup, but a quantity in the bottom of the cylinder, nearly an inch. I confess I was puzzled; but after trying several ways of solving the difficulty, I did so. When the rain is so tremendous the funnel becomes full, the small tube not being sufficiently large to carry it off by a gentle stream into the cup, consequently the pressure forces it in a stream over the edge of the cup in the direction shewn in the sketch. True, the cylinder receives it, but it is most desirable that all the rain, under any extraordinary circumstances, should fall into the cup, and I think it might be easily remedied by the bore of the funnel being enlarged. Another objection to the small aperture in the funnel is the danger (in such rain as we then had) of the funnel being choked by grit from splashing, as mine was for a time. Perhaps this is worth your notice.



Yours truly,

A. RAWSON.

The Vicarage, Bromley Common, Kent, Sept., 1st, 1875.

To the Editor of the Meteorological Magazine.

SIR,—Yesterday, August 7th, after the warmest night this year (min. 59°·9) and a hot, calm morning, a storm of an almost tropical

character, accompanied by a squall which did considerable damage to the trees, suddenly broke over Beckenham.

Violent thunder and lightning, with a deluge of rain and hail began at 1.54 p.m., and in a few minutes the roads were converted into rivers, and all low-lying parts flooded from 6 inches to a foot deep. By 2.24 p.m. 1·440 in. of rain had fallen, considerably more than an inch of it in the first ten minutes. The thunder and lightning continued till past 5 p.m., and heavy showers at about half-past 2 and a quarter to 5 p.m. increased the total rainfall during the storm to 1·686 in., or ·253 in. more than fell during the 24 hours' incessant downpour between 9 a.m. on the 15th and 9 a.m. on the 16th of July. With the exception of a few minutes during the storm, the day was calm and the barometer was steady.—Yours truly,

PERCY BICKNELL.

Foxgrove, Beckenham, 8th August, 1875.

To the Editor of the Meteorological Magazine.

SIR,—There was a terrific thunderstorm here on 7th ult., and as the rainfall was so large for that day I send you note of the total amount, viz., 1·745 in. I am told that "nearly the whole of it fell between 3 and 4 p.m.; it began with large hailstones, and then sheets of water straight down," and that it came from N.E. Also that there was no rain at West Wickham, three miles south of here, nor any at Croydon, and much less at Penge than here; at Blackheath it was tremendous.—Yours very truly,

C. O. F. CATOR.

Beckenham, 1st Sept., 1875.

To the Editor of the Meteorological Magazine.

SIR,—It may interest you to know that the quantity of rain which fell here on Saturday afternoon was 1·40 of an inch. I am informed that at Bickley, about half-a-mile from here, the fall was 1·70 in.

Yours faithfully,

HUGH A. SILVER.

Hillside, Chislehurst, August 9th, 1875.

To the Editor of the Meteorological Magazine.

SIR,—On Friday, the 6th inst., we had a heavy shower from 3.58 to 4.3 p.m., in which ·08 in. of rain fell, accompanied with thunder; it came from E.N.E.

On Saturday, the 7th, we had a severe thunderstorm from 1.45 to 2.45 p.m.; the rain was tremendous, flooding the roads and gardens more than I have ever observed here before. It passed over us from S.E. to N.W., and thunder was heard from distant storms in S.E.–N. till 5.5 p.m.

The wind was N.E. at 9 a.m.; E. at noon, 1.35, and 2.35 (strong); S. at 1.15; S.S.E. at 2; S.W. at 2.10; S.S.E. at 2.20; S.E. at 5;

E.S.E. at 7; S.W. at 8; S.E. at 9; and W. at 11.30 p.m.; generally calm afternoon, and atmosphere oppressive. Shade temp.: max. 83°·8, min. 60°. Thunder first heard in S.E. at 1.33 p.m., was frequent and loud, with vivid lightning, quarter to half-a-mile distant, 2.3 to 2.28 p.m.; lightning again in S.E. at 4.30 p.m.; there was a slight shower from 5.10 to 5.20.

Rain fell 1.45–2.45 p.m., heavily 1.55–2.40, and 2.41–2.42; very heavily 2.2–2.12; 2.14–2.24, at times to 2.32, and again at 2.39 p.m. No rainfall before 1.45; 0·07 in. by 2; 0·25 in. by 2.7; 0·36 in. by 2.9; 1·28 in. by 2.35; 1·37 in. by 2.37; 1·44 in. by 2.40; 1·48 in. by 2.45 (no measurable amount fell till 9 a.m. on 8th); this is the max. daily fall yet registered here. The heaviest rates were: 0·11 in. 2.7–2.9 (2 min.) [=3·30]; 1·12 in. 2.7–2.37 (30 min.) [=2·24]; 1·37 in. 2.0–2.40 (40 min.) [=2·06]; and the total 1·48 in. 1.45–2.45 (one hour).

Yours very truly,

E. E. GLYDE.

3, *Church Road, Forest Hill, S.E., Aug. 9th*, 1875.

To the Editor of the Meteorological Magazine.

SIR,—A violent thunderstorm, accompanied by a deluge of rain, burst over this town yesterday at noon. Rain had been falling steadily but in small quantities from 9 in the morning. At noon, the clouds seemed as if massed together, and from that hour till 2 p.m. there was an almost incessant downpour, the rainfall at 2 p.m. being 1·89 inches; the afternoon was comparatively fine, but at 7 p.m. rain again came on, sometimes heavily, but nothing comparable to the fall at noon. The total rainfall during the 24 hours was 2·21 inches, greater than any registered within the last five years.

I am, yours faithfully,

RICHARD TYRER.

Grove House, Mansfield, August 8th, 1875.

AUGUST METEORS.

To the Editor of the Meteorological Magazine.

SIR,—A look-out was kept up for the Perseides from 10 p.m. last night, August 10th, to 1.30 a.m. this morning, August 11th; but notwithstanding the fineness of the night, not more than from 90 to 100 meteors were observed during the whole of that time. Of these about a dozen were equal to stars of first magnitude, and accompanied by trains; the rest from second to fourth magnitude, a few exceedingly minute ones not being counted. Two observers were looking out, but the attention of both was generally directed to the same portion of the heavens, viz., the S.E. hemisphere from 10 p.m. to about midnight, and N.W. hemisphere from about midnight to 1.30 a.m. The sky was brilliantly clear, excepting a cloudy period from 10.20 to 10.50 p.m.

G. T. RYVES.

Tean Vicarage, near Cheadle, Staff., Aug. 11, 1875.

DETAILS OF A FLASH OF LIGHTNING.

To the Editor of the Meteorological Magazine.

SIR,—As I think you collect statistics of damage done by lightning, you may like to know that during the tremendous storm which prevailed here, between 4.30 and 5.30 p.m., on Thursday, August 12th, a house was struck at Lower Tean, a hamlet about half-a-mile to the south of Upper Tean, and the chimney completely demolished, but no further injury done of a serious character, though the escape of the inmates of the house was, under the circumstances, little short of miraculous. I inspected the house, or rather houses, for there were three all in one block, more or less touched; but a full report would take too much time. I may, however, say that, after smashing the chimney-stack, the *debris* of which was not hurled in one direction but scattered to every quarter of the compass, as if by an explosion from within, the main weight of the discharge—or, at any rate, a portion of it—forced its way through the outer wall, leaving a rift about a foot long and perhaps an inch wide, and glanced on to a spouting which it followed along the fronts of the three houses and round to the back of the third (*i.e.*, the farthest from the one first struck), where it found its way down by an escape-pipe to the water-butt, which it slightly chipped in two places, leaving no further trace of its course. In passing along the fronts of the three houses it melted some of the lead in a lattice window which stood open in the first house, also a small portion of the spouting; knocked down a child who was standing at the open door of No. 2, burning two of his fingers, and broke a tile and partly dislodged a few bricks in passing from No. 2 to No. 3. It also melted a part of the pipe by which it descended to the water-butt.

The remainder of the discharge seems to have found its way down the chimney into the room beneath and out at the open door. A child, who was sitting near the door with his back against a little closet, on the opposite side of the room to the fire-place, declared that it saw a ball of fire come down the chimney and pass out at the door. And that part of the flash must have gone that way is proved by the fact that the child's hair was singed, and that the outside surface of a board forming part of the closet, against which he was sitting, was completely blistered. Finally, a man who was breaking coal in the yard outside the door in question, declared that the flash passed through his legs! and, improbable as this sounds, yet, if for *the flash* we read *part of the flash*, his story may after all be true, as, in breaking coal with his back to this door, which I ascertained to be the case, the pick or coal hammer would have been in such a position as to attract that part of the electric discharge which passed out at the door.

All these facts and impressions I had from the occupier of the house which was struck and his neighbours on the spot, so that they have at any rate the advantage attaching to evidence obtained at first hand.

Yours faithfully,

GEORGE T. RYVES.

Tean Vicarage, Stoke-on-Trent, Aug. 19th, 1875.

RAINFALL AND YIELD OF WELLS.

To the Editor of the Meteorological Magazine.

SIR,—In the December number of the *Meteorological Magazine* you inserted a letter of mine on the above subject. The January rainfall of this year here, 4·10 in., of which nearly 2·00 in. fell between the 20th and 26th of that month, raised the well on which I rely 2 ft. 6 in., making a total with the autumn rise of 5 ft. 6 in.—a fair average stock of water to be given out during the remainder of the year, with the addition of a small rise in February. It might be expected that the heavy July fall here, 4·45 in., of which 3·21 in. fell between the 15th and 22nd, inclusive, would have raised the subterranean stock of water considerably, whereas the water in the well only rose 1½ inches, confirming the assertion of my letter, October 31st, 1874: That it is rather the conditions under which the rain falls than the quantity falling which rules the subterranean supply. The large amount of July rain did little more than replace the evaporation and that absorbed by vegetation. The surface wells, gravel on clay, were raised about 6 inches, as might be expected.

I am, Sir, yours faithfully,
J. C. CLUTTERBUCK.

Long Wittenham, August 9th, 1875.

SUPPLEMENTARY TABLE OF RAINFALL IN AUGUST, 1875

[For the Counties, Divisions, Latitudes, and Longitudes of these Stations, see Met. Mag., Vol. X., p. 28.]

Station.	Total Rain.	Station.	Total Rain.
	in.		in.
Acol	1·62	Gainford	2·40
Hailsham	...	Shap	2·83
Strathfield Turgiss	1·24	Llanfrechfa	2·67
Addington Manor	1·30	Castle Malgwyn	6·01
Oxford	1·37	Heyope	3·59
Cambridge	1·05	Melrose	2·19
Sheering	1·35	Cessnock, Glasgow	2·62
Ipswich	·74	Gruinart	4·34
Diss	·73	Keith	3·02
Swaffham	·85	Strathconan	3·62
Compton Bassett	1·18	Springfield, Tain	2·14
Hessary Tor, Dartmoor	5·37	Skibbereen	2·60
Teignmouth	2·17	Fermoy	3·02
Torrington	3·34	Kilrush	1·59
Trevarrick, St. Austell	2·81	Kilkenny	2·54
Taunton	2·42	Kilsallaghan	1·87
Cheadle	2·50	Twyford, Athlone	3·17
Ashby de la Zouch	2·28	Ballinasloe	2·30
Coston, Melton Mowbray	2·79	Kylemore	5·39
Bucknall	2·01	Bangor	2·12
Mansfield	3·45	Carrick on Shannon	3·71
Walton, Liverpool	2·76	Warrenpoint	3·62
Broughton-in-Furness	4·54	Bushmills	4·17
Stanley, Wakefield	2·46		

REVIEW.

Jahrbücher der KK central-anstalt für Meteorologie und Erdmagnetismus, von Dr. Carl Jelinek, KK Hofrath u.s.w., und Prof. F. Osnaghi, Neue Folge ix. *Jahrgang*, 1872, *und Neue Folge* x. *Jahrgang*, 1873. 4to. Vienna: Braumüller, 1874 and 1875.

WE are sorry to see that Dr. Jelinek has not yet reduced his staff to anything like uniformity of procedure, although it was better in 1873 than in 1872, and we, therefore, hope that it will steadily improve. Nearly all his observers take readings three times daily, and of the total number (138) nearly half of them observe at 7 a.m., 2 p.m. and 9 p.m.; another body, of about thirty, observe at 6, 2 and 10; while the rest of the corps indulge in an almost endless variety of combinations, in fact there were 24 varieties in 1872, and 19 in 1873. As some of these combinations give very different mean values from others, it is most desirable that some one system should be adopted, and that all observations not made in accordance therewith should either be rejected or printed separately.

There are, however, a few stations which are even worse arranged, for the observers change their hours of observation two or more times a year. They would hardly do worse if they returned to the bad old plan of taking observations at the times of sun-rise and sun-set.

We hope that Dr. Jelinek will turn his attention to this subject, and that in succeeding years we shall see the nineteen varieties reduced to two or three, and all returns not made with absolute uniformity throughout the year, thrown into an appendix, or otherwise prevented injuring the other values.

The Appendix to the volume for 1872 contains very useful abstracts of 33 years' (1841–73) observations at Trieste, and of 46 years (1828-73) at Bodenbach, in Bohemia. The volume for 1873 has the convenient addition of a clearly printed map of the stations of which the returns are quoted in the volume.

The leading features of the Meteorological data for the two stations just mentioned are as follows:—

Station	Nautical Academy, Trieste.	Bodenbach, Bohemia.
Latitude	45° 48′ N. ...	50° 46′ N.
Longitude	13° 46′ E. ...	14° 8′ E.
Height above Sea	78 ft.	466 ft.
Period	1841–73	1828–1873.
Mean temp. in shade	57°·8	47°·5.
Highest mean, yearly temp. & date.	60°·6, 1841 ..	51°·3, 1834.
Lowest ,, ,, ,, ,,	55°·6, 1864 ...	43°·9, 1838.
Max. in shade and date	99°·5, July, 1873...	100°·6 { July, 1828. Aug., 1830.
Min. ,, ,, ...	10°·6, Dec., 1855...	—29°·4, Feb., 1830.
Mean Sea Level pressure	29·961 in.... ...	30·020 in.
Max. ,, ,, ,, and date ...	30·774, Jan., 1859.	30·952, Dec., 1840.
Min. ,, ,, ,, ,, ...	28·839, Feb., 1843.	28·834, Dec., 1856.
Mean yearly rainfall	43·31 in.	24·88 in.
Greatest ,, ,, and date ...	63·15, 1855 ...	34·84, 1854.
Least ,, ,, ,, ...	26·58, 1865 ...	17·28, 1842.
Greatest rainfall in 24 hours ...	5·39, Oct., 1849 ...	1·89, July, 1860.

AUGUST, 1875.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1860–5	Greatest Fall in 24 hours. Dpth	Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date.	Min. Deg.	Date.	No. of Nights below 32° In shade	On grass
			inches	inches.	in.								
I.	ENGLAND.	Camden Town	1·79	— ·85	·66	19	12	86·1	16	45·3	2	0	0
II.		Maidstone (Linton Park)	1·38	— 1·33	·82	29	8	87·0	16	48·0	2	0	0
,,		Selborne (The Wakes)	1·32	— 1·86	·28	10	12	78·0	14	39·0	2	0	0
III.		Hitchen	1·32	— 1·03	·67	28	11	77·0	16	41·0	1	0	...
,,		Banbury	1·12	— 1·01	·21	12	11	84·0	16	43·0	1	0	0
IV.		Bury St. Edmunds (Culford)	·88	— 1·56	·38	13	10	84·0	16	41·0	1	0	0
V.		Bridport	2·16	— ·43	·94	8	13	72·5	20	40·0	2	...	..
,,		Barnstaple	3·30	— ·89	1·00	8	16	80·0	17	48·0	5	...	...
,,		Bodmin	2·77	— 1·09	·95	11	13	74·0	16	46·0	22	0	0
VI.		Cirencester	1·21	— 1·63	·23	9	9	...	...	...	...	...	...
,,		Shifnal (Haughton Hall)	3·56	+ ·69	·87	11	18	78·0	16	43·0	21	0	0
,,		Tenbury (Orleton)	4·08	+ 1·20	1·71	3	16	80·8	16	41·0	21	0	0
VII.		Leicester (Belmont Villas)	2·57	+ ·38	·77	7	15	86·0	16	47·5	3	0	0
,,		Boston	1·91	— ·38	1·15	12	11	85·0	16	45·0	2	0	0
,,		Grimsby (Killingholme)	2·82	...	1·07	7	13	80·0	16	46·0	2	0	...
VIII.		Manchester	5·00	+ 1·50	1·58	7	19	82·0	17	41·0	5	0	0
IX.		York	2·17	— ·54	...	...	...	82·0	16	42·0	9	...	...
,,		Skipton (Arncliffe)	3·56	— 2·38	·80	9	20	75·0	1	36·0	4	...	...
X.		North Shields	3·41	+ ·56	1·00	7	16	72·3	16	42·8	5	0	0
,,		Borrowdale (Seathwaite)	7·87	— 6·27	1·74	23	16	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely)	..	...	...	...	...	...	...	...	...	...	...
,,		Haverfordwest	4·66	— ·22	1·76	10	14	73·5	8	45·0	4, 9*	...	...
,,		Rhayader (Cefnfaes)	...	...	...	...	...	...	...	..	...	...	...
,,		Llandudno	2·00	— 1·82	·39	8	13	76·2	12	47·5	20	...	...
XII.	SCOTLAND.	Dumfries (Crichton Asylum)	2·31	— 1·56	·43	3	14	70·6	16	43·2	2	...	...
,,		Hawick (Silverbut Hall)	2·38	...	·44	9	21	...	...	...	...	...	...
XIV.		Kilmarnock (Annanhill)	3·37	...	1·30	16	18	69·7	17	46·0	5	0	0
XV.		Castle Toward	4·55	— 1·75	·72	17	18	...	...	...	...	...	...
XVI.		Leven (Nookton)	1·51	— 1·48	·23	18	18	75·0	15	43·0	20	0	0
,,		Stirling (Deanston)	...	...	...	...	...	...	...	...	..	...	...
,,		Grandtully	2·89	...	·39	30	20	...	...	..	...	...	...
XVII.		Braemar	3·20	— ·64	·55	12	24	70·3	15	37·8	20	0	0
,,		Aberdeen	2·35	...	·55	22	20	73·2	17	45·9	20	0	0
XVIII		Loch Broom	3·81	...	·42	29	18	...	...	...	...	...	..
,,		Portree	8·23	+ ·78	1·73	20	18	...	...	...	...	...	...
,,		Inverness (Culloden)	2·06	— 1·19	·53	31	16	71·0	16	44·8	2	0	0
XIX.		Helmsdale	2·91	...	·47	31	17	...	...	...	...	...	...
,,		Sandwick	2·68	— 1·03	·45	29	16	68·8	5	43·2	14	0	0
XX.	IRELAND.	Caherciveen Darrynane Abbey	3·24	...	·76	23	11	...	...	...	...	...	...
,,		Cork	2·41	...	·51	31	14	...	...	...	...	...	...
,,		Waterford	2·28	— 1·67	·73	8	13	73·0	18	48·0	2,27	...	0
,,		Killaloe	3·48	— 1·45	·93	16	17	81·0	1	37·0	2	.	...
XXI.		Portarlington	1·63	— 2·87	·36	24	18	74·0	9	45·0	5	0	...
,,		Monkstown, Dublin	1·47	— 1·74	·67	9	11	...	...	...	...	...	...
XXII.		Galway	...	...	...	...	...	...	...	...	...	...	...
,,		Ballyshannon	3·60	...	·53	9	19	...	...	...	...	...	...
XXIII		Waringstown	2·63	...	·56	7	18	80·0	1, 2	41·0	4	0	0
,,		Edenfel(Omagh)	3·98	...	·72	7	18	72·0	15	38·0	6	0	0

* And 29.

+Shows that the fall was above the average; —that it was below it.

METEOROLOGICAL NOTES ON AUGUST.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

LINTON.—A very fine, useful month for the farmer, the ample R of July supplying vegetation with the necessary moisture. Fogs frequent, but very little T; a heavy but useful R, ·82 in., on the 29th, and a less plentiful one on the 22nd; otherwise the month a very dry one, with no lack of sunshine; winds mostly S. and S.W., but never high; bar. steady; on the whole a remarkably fine month.

SELBORNE.—Fog on 6th, 7th, 20th, 24th, 30th, and 31st.; T at 7 p.m. on 7th, and TS at 3 a.m. on 9th. Prevailing winds S. and S.W. at the middle of the month. R very much below the average for August; the finest crop of hops for 25 years.

BANBURY.—Fog on 3rd; TS on 3rd, 9th, and 12th; T on 6th and 7th.

CULFORD.—T on 6th and 12th. A somewhat dry and warm month, the max. temp. being in both cases considerably above that of the preceding month (July). Easterly winds only on four days.

BODMIN.—Mean. temp. 65°·3. R very much below the average.

SHIFNALL.—The R of July, after ten days' interval, returned on the night of the 5th, and continued daily till the 15th, the fall of the 11th and 12th amounting to 1·26 in. The temp. of the nights low till the 6th, T in the distance on 3rd. A violent storm from W., with pitch darkness, at 4.30 p.m. on 12th; distant T again on 19th p.m. in S.E., and violent on 28th, at 5.30 p.m. in E. Tree wasps (*V Britanica*) unusually abundant; but these, as well as the common ones, destroyed by the R. Fungi of all sorts plentiful, but not a mushroom since those in May. Nuts and all fruit plentiful, especially damsons and plums. Potatoes sadly diseased.

ORLETON.—The first half of the month was warm, damp, and cloudy, with R almost every day. The last half was fine harvest weather, warm and bright, with very little R. Soon after 11 a.m. on 3rd, a violent storm of L, T, H, and R burst over us; about 1·50 in. of R fell in less than one hour. Another TS occurred about 4 a.m. on the 9th, with heavy R; and another great fall of R occurred early on the morning of the 11th, which filled the brooks and rivers. The temp. of the month was about 1° higher than the average, and was very uniform. T was frequently heard in the distance, and L seen at night; there was no high wind.

LEICESTER.—A severe TS between 10 a.m. and noon on the 7th, and again between 6.25 and 6.50 p.m. Some houses on the Humberton Road were struck, and about £50 worth of damage done. TS also on 9th and 12th. After 14th, fine harvest weather; temp. above 80° on one day only (16th).

BOSTON.—Very heavy TS on 12th; wind from N.W.; ·60 of R fell in 25 minutes; total in the day, 1·15. Harvest begun on the 6th. New wheat brought to market on 21st, which is exactly the average time; cutting finished by the end of the month. The cold temp. and heavy R of July spoiled a most promising crop; the yield is generally estimated as 25 per cent. less than that of last year.

GRIMSBY.—Heavy hailstorm on 9th; harvest general on 11th; month fine and warm; corn crop deficient both in quantity and quality. Potatoe disease worse than for several past years; apples, plums, &c., abundant; root crops excellent. T and R between 10 a.m. and noon on 29th.

MANCHESTER.—7th, heavy T S, H and heavy R; 10th, meteors from 10 to 11 p.m.; heavy T S on 12th, and another on 13th.

ARNCLIFFE.—A beautiful month.

NORTH SHIELDS.—T on 8th, and TS with heavy R on 10th.

SEATHWAITE.—T on 7th, 9th, 10th, and 11th; L on 29th; R fell on 16 days, but the fall (7·87) was little more than half the average.

WALES.

HAVERFORDWEST.—The first five days warm and bright, then came a period of broken weather, with heavy rainfall continuing, more or less, to the 17th; high temp. day and night. The 9th stormy, sultry air, much T and L; a remarkable whirlwind, about 5 miles from Haverfordwest, on the river Cleddan; during the storm of T, L and R, a haycock was lifted some 50 feet in the air; stones and gravel were also lifted and strewn like a hail-shower over a space of a quarter-of-a-mile; the phenomena was accompanied by a loud rumbling noise like mill machinery; the L was forked and very vivid, and the rainfall great in some places; on the morning of the 10th, in little more than 4 hours 1·76 in. of R fell here, occasioning a disastrous flood, Stepaside and Egremont bridges being carried away; still, taking the whole month, harvest operations were more successful than anticipated. At 3 a.m. on 10th very dark, drizzling, but no R of consequence till 5 a.m.; air very still, then a deluge descended, producing in some districts, particularly in the mountainous parts of the country, floods of unprecedented magnitude; near Llysifran and Egremont two bridges carried away, and much hay and corn lying in the lowlands carried quite away; this R of nearly 2 inches falling in 4 hours, between 5 and 9 a.m., produced much more disaster than the great fall of July, which took 29 hours to produce 3·33 in.

LLANDUDNO.—9th, T S about 2 p.m., R in the night; 12th, T S at 1.30 p.m.; the mean temp. (though slightly below that of August, 1874) was rather more than 1° above the average. The rainfall was considerably below the average, in fact very little more than half; altogether a month of fine weather.

SCOTLAND.

DUMFRIES.—Month generally warm, without any high winds; R only one-third of the fall of August, 1874; and considerably below the average. Mean. temp. 2°·5 higher than last August; T on 9th and 12th.

HAWICK.—Heavy TS on 9th; rather unsettled from 1st to 14th; then fine to 25th.

ANNANHILL.—T on 2nd, T and heavy R on 3rd and 12th; bar. pressure about the same as last month, mean. temp. 2° above it; Ozone abundant, the mean being 5·7, the tests shewing the max. on several days under S.W. winds; prevailing winds S.W., light to moderate; month generally unsettled; skies cloudy and threatening; T and vivid L, with heavy R on the evening of the 30th; harvest operations far advanced; crops generally good; blight appeared in the potatoe on the 13th. Foot and mouth disease very virulent among the cattle, and in many cases fatal.

CASTLE TOWARD.—Harvest is now begun, much of the corn is ripe, and the remainder rapidly becoming so, all accounts agree that the corn bulks well, but early threshing will soon try the quality of the new crops. Beans still green in the stalk and looking well; turnips, large bulbs and still growing; potatoes are fading fast, and in the shaws rather prematurely; the disease has set in here but slightly as yet. Farmers digging up large portions, and forwarding them to market where they fetch fair prices. Foot and mouth disease spreading, but no cases fatal.

BRAEMAR.—Rather a dull month; crops looking well; T, 11 to 2, on 11th; T S 10 to 12 p.m. on 17th.

ABERDEEN.—T on 2nd, 8th, and 11th; and T S, 10 to 11 p.m. on 17th; Fog on 3rd, 14th, 25th and 29th. Bar. pressure and mean temp. above the average; R and wind pressure below it. A month of dull, quiet, and very mild weather, with fewer heavy rains than usual.

LOCHBROOM.—The R retards the cutting of the crops very much, indeed it is beginning to be rather serious now.

PORTREE.—A fine month on the whole; squally from 16th to 27th with frequent heavy R, upwards of 1·00 in. fell on 21st, 23rd, and 24th, total fall 8·23, making 41·64 in. since 1st of January. All kinds of crops look well; the harvest will be general here within a week. Potatoes abundant and of fine quality; turnips doing well.

SANDWICK.—A fine month, the temp. above and the rainfall considerably below the average. Harvest is begun, and crops looks well; T about 5 p.m. on 25th.

IRELAND.

DARRYNANE.—A fine harvest month, with some days of heavy R like T showers. On the 12th when there was no measurable R fell here, about 1 mile distant and 400 feet above my guage the R was very heavy, and a few miles off so much so as to flood the rivers and endanger the bridges.

MONKSTOWN.—Month unusually dry and warm, extremely favourable for farming operations.

BALLYSHANNON.—Although there were some heavy rains and high winds during the month, it was nevertheless a favourable one for ripening the harvest, and making hay. This neighbourhood is very free from the potato disease, and the principal crops are abundant.

WARINGSTOWN.—Harvest commenced generally about the 20th; weather rather stormy, but crops excellent.

EDENFEL, OMAGH.—Weather, although somewhat broken, has been for the most part very favourable. Harvest general from the 20th, with the most abundant promise within living memory.

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